CLAIMS

30. A method for improving opacity of paper, said paper manufactured by drying a furnish mixture of an aqueous pulp slurry and at least one preselected filler, said method comprising incorporating into said furnish mixture a preselected filler comprising a multiple phase calcium silicate hydrate comprising a major component comprised of foshagite, and a minor component of xenotlite, said multiple phase mixture

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(a) having an x-ray diffraction pattern substantially as set forth in Table 1c of the specification, and

(b) a fibrous crystalline structure comprising

(i) foshagite having (A) a diameter of less than about 0.2 microns, and (B) a length greater than about 1 micron, and

(ii) xenotlite particles having (A) a diameter of less than about 0.3 microns, and (B) a length of greater than about 1 micron.

31. The method as set forth in claim 30, wherein said multiple phases calcium silicate hydrate comprises a plurality of stable secondary particles, said stable secondary particles comprising an interlocking structure of primary fibrous crystals.

32. The method as set forth in claim 31, wherein said stable secondary particles comprise a porous haystack like structure of median diameter from about 10 to about 40 microns.

33. The method as set froth in claim 30, wherein in said multiple phase calcium silicate hydrate has a water absorption characteristic of at least 400 percent by weight.

34. The method as set forth in claim 30, wherein said multiple phase calcium silicate hydrate has a water absorption characteristic of at least 800 percent by weight.

35. The method as set forth in claim 30, wherein said multiple phase calcium silicate hydrate has a water absorption characteristic of from about 500 percent to about 1000 percent by weight.

36. The method as set forth in claim 30, wherein the percentage of foshagite is at least seventy (70) percent.

37. The method as set forth in claim 30, wherein the percentage of foshagite is at least eighty (80) percent.

38. The method as set forth in claim 30, wherein the percentage of foshagite is at least ninety (90) percent.

39. The method as set forth in claim 30, wherein said foshagite has a diameter from about 0.1 to about 0.2 microns.

40. The method as set forth in claim 30, wherein said foshagite has a length from about 1 micron to about 5 microns.

41. The method as set forth in claim 30, wherein said xenotlite particles have a diameter from about 0.1 to about 0.3 microns.

42. The method as set forth in claim 30, wherein said xenotlite particles have a length of from about 1 microns to about 3 microns.

43. The method as set forth in claim 30, or in claim 32, wherein said multiple phase calcium silicate hydrate

comprises a hydrothermal reaction product of an aqueous suspension of lime and a siliceous material in a CaO to SiO2 mole ratio of between 1.2 to 1 and about 1.7 to 1.

44. The method as set forth in claim 30 or in claim 32, wherein said multiple phase calcium silicate hydrate comprises a hydrothermal reaction product of an aqueous suspension of lime and a siliceous material in a CaO to SiO2 mole ratio of about 1.35 to 1.

45. The method as set forth in claim 30 or in claim 32, wherein said paper has a Gurley porosity, and wherein addition of said multiple phase calcium silicate hydrate to said furnish simultaneously increases said Gurley porosity and said opacity.

46. The method as set forth in claim 45, wherein said paper has a bulk, and wherein addition of said multiple phase calcium silicate hydrate to said furnish simultaneously increases said bulk with said opacity.

47. The method as set forth in claim 45, wherein said paper has a measurable smoothness, and wherein addition of said multiple phase calcium silicate hydrate to said

furnish simultaneously increases (a) said measurable smoothness, (b) said bulk, (c) said opacity, and said porosity.

48. The method as set forth in claim 46, wherein said paper has a measurable print show through, and wherein addition of said multiple phase calcium silicate hydrate to said furnish (a) decreases measurable print show throw, and (b) increases (i) said measurable smoothness, (ii) said bulk, and (iii) said opacity.

49. The method as set forth in claim 46, wherein said paper has a measurable sheet stiffness, and wherein addition of said multiple phase calcium silicate hydrate to said furnish increases measurable sheet stiffness.

50. The method as set forth in claim 30, wherein said paper has a brightness, and wherein addition of said multiple phase calcium silicate hydrate to said furnish increases said brightness.

51. The method as set forth in claim 30, wherein said paper has a sheet scattering coefficient, and wherein addition of

said multiple phase calcium silicate hydrate to said furnish increases said sheet scattering coefficient.

52. The method as set forth in claim 46, wherein said paper has a sheet tensile index, and wherein addition of said multiple phase calcium silicate hydrate to said furnish increases said sheet tensile index.

53. A method for improving opacity of paper, said paper manufactured by drying a furnish mixture of an aqueous pulp slurry and at least one preselected filler, said method comprising incorporating into said furnish mixture a preselected filler comprising a multiple phase calcium silicate hydrate comprising a major component comprised of foshagite, and a minor component of xenotlite, said multiple phase mixture

(a) having an x-ray diffraction pattern substantially as set forth in Table 1c of the specification, and

(b) a fibrous crystalline structure comprising

(i) foshagite having (A) a diameter of less than about 0.2 microns, and (B) a length greater than about 1 micron, and

(ii) xenotlite particles having (A) a diameter of less than about 0.3 microns, and (B) a length of greater than about 1 micron;

(c) a plurality of stable secondary particles, said stable secondary particles comprising an interlocking structure of primary fibrous crystals, wherein said stable secondary particles comprise a porous haystack like structure of median diameter from about 10 to about 40 microns.

54. The method as set forth in claim 53, wherein

(a) said paper has a Gurley porosity, and wherein addition of said multiple phase calcium silicate hydrate to said furnish simultaneously increases said Gurley porosity and said opacity; and

(b) said paper has a bulk, and wherein addition of said multiple phase calcium silicate hydrate to said furnish simultaneously increases said bulk with said opacity;

(c) said paper has a measurable smoothness, and wherein addition of said multiple phase calcium silicate hydrate to said furnish increases said measurable smoothness; and

(d) said paper has a measurable print show through, and wherein addition of said multiple phase calcium silicate hydrate to said furnish decreases measurable print show through; and

(e) said paper has a measurable sheet stiffness, and wherein addition of said multiple phase calcium silicate

hydrate to said furnish increases measurable sheet stiffness; and

(f) said paper has a brightness, and wherein addition of said multiple phase calcium silicate hydrate to said furnish increases said brightness; and

(g) said paper has a sheet scattering coefficient, and wherein addition of said multiple phase calcium silicate hydrate to said furnish increases said sheet scattering coefficient;

(h) said paper has a sheet tensile index, and wherein addition of said multiple phase calcium silicate hydrate to said furnish increases said sheet tensile index.

55. The method as set forth in claim 30 or in claim 54, wherein said calcium silicate hydrate has an ISO brightness from about 94 to about 97.

56. A method for improving sheet stiffness of paper, said paper manufactured by drying a furnish mixture of an aqueous pulp slurry and preselected fillers, said method comprising incorporating into said furnish mixture a multiple phase calcium silicate hydrate comprising a major component comprised of riversideite, and a minor component of xenotlite, said multiple phase mixture having

(a) an x-ray diffraction pattern substantially as set forth in Table 2c of the specification, and

(b) an irregular globular structure having an outside diameter from about 10 to about 30 microns.

57. The method as set forth in claim 56, wherein in said multiple phase calcium silicate hydrate has a water absorption characteristic of at least 250 percent.

58. The method as set forth in claim 56, wherein said multiple phase calcium silicate hydrate has a water absorption characteristic of between 200 and 500 percent.

59. The method as set forth in claim 56, wherein said paper has a measurable stiffness and a measurable bulk, and wherein in said measurable stiffness is simultaneously increased along with said bulk.

60. The method as set forth in claim 56, wherein said paper has a measurable print show through, and wherein in measurable print show through is decreased while simultaneously increasing bulk and stiffness.